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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/804,203

03/19/2004

Ronald H. Knapp

6502

7590

01/30/2007

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EXAMINER

MONBLEAU, DAVIENNE N

ART UNIT

PAPER NUMBER

2878

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/30/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/804,203

Applicant(s)

KNAPP, RONALD H.

Examiner

Davienne Monbleau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12/1/04 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

The amendment filed on 12/1/04 has been entered. Claims 15, 17, and 18 have been amended. New claims 19 and 20 have been added. Claims 1-20 are pending.

### ***Drawings***

Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

Claim 2 recites the limitation "the optical fibers" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 14, line 3: "of the light sensor" should be changed to -- of the optical fiber --.

Further regarding claim 14, the phrase "the optical fiber crossing on the outer surface" is not complete because it does not indicate what its crossing. Thus it is not clear whether it is crossing over additional separate objects or rather is helically wound such that it is crossing over itself at particular locations.

Claim 15 recites the limitation "the tank liner" in lines 11 and 12. There is insufficient antecedent basis for this limitation in the claim.

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Claim 16 recites the limitation "the fibers" in line 2. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

*Claims 1-3, to the extent taught and understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Innocenti et al. (EP 0 892 244).*

Regarding claim 1, *Innocenti (Figure 1)* discloses a sensor apparatus for tank volume change, comprising a tank (1), an optical fiber (4) wound on the tank, the optical fiber (4) having opposite ends exposed for receiving and outputting light energy, and a covering (3) over the optical fiber (4). (See also column 4, lines 14-19: determining volume change).

Regarding claim 2, *Innocenti (Figure 1)* discloses that the tank (1) is a cylindrical tank, and wherein the optical fibers (4) are wound in spaced loops in a first helical direction along the cylindrical tank (1) and subsequently are wound in spaced loops in a second helical direction along the cylindrical tank (4). (See also column 2, lines 30-35: fiber is helically wound.)

Regarding claim 3, *Innocenti (Figure 1)* discloses that the tank (1) is a tank liner (2), and the covering (3) comprises a filament winding in a filament wound composite gas storage tank. (See column 2, lines 24-30.)

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

*Claims 4-20, to the extent taught and understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Innocenti in view of Jones (U.S. 4,880,970).*

Regarding claim 8, *Innocenti (Figure 1)* teaches a method of providing sensors for tank volume changes, comprising: providing a tank (1), providing an optical fiber (4) on the tank, securing the entire optical fiber (4) to the tank (1), providing and exposing ends on the optical fiber (4) for receiving light (4a) and outputting light (4b); and covering (3) the optical fiber (4) and the tank. *Innocenti* does not teach providing obstructions on the tank and providing pinch points in the optical fiber by crossing the optical fiber over the obstructions. *Jones (Figure 5)* teaches an optical fiber (1) helically wound about a cylindrical object (7) in two directions, wherein part of the fiber (1) provides obstructions on the tank and providing pinch points (8) in the optical fiber (1) by crossing the optical fiber over the obstructions. It would have been obvious to one of ordinary skill in the art at the time of the invention to form bends in the fiber around the tank in *Innocenti*, as taught by *Jones*, as an additional indication that the pressure within the tank has changed, and hence a change in volume. (See *Jones*, columns 3-4.)

Regarding claim 15, *Innocenti (Figure 1)* teaches a pressure tank apparatus, comprising a tank (1) having an inlet and outlet, an optical fiber (4) secured to an outer surface of the tank (1) and having opposite ends for receiving (4a) and outputting (4b) light, the opposite ends being

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fixed near the inlet and outlet for connecting respectively to a light source (6) and to a light sensor (8) as the tank (1) is filled with gas under pressure, and a composite material overwrap (3) covering the optical fiber (4) for withstanding internal pressure within the tank liner (2) and resisting expansion of the tank liner (2). *Innocenti* does not teach the optical fiber crossing on the outer surface of the tank and forming bends and pinch points at the crossings. *Jones* (Figure 5) teaches an optical fiber (1) helically wound about a cylindrical object and crossing on the outer surface of the object and forming bends and pinch points (8) at the crossings. It would have been obvious to one of ordinary skill in the art at the time of the invention to form bends and pinch points in the fiber around the tank in *Innocenti*, as taught by *Jones*, as an additional indication that the pressure within the tank has changed, and hence a change in volume. (See *Jones*, columns 3-4.)

Regarding claim 4, *Innocenti* (Figure 1) teaches an optical fiber (4) wound about a tank (1), but does not teach that the fiber (4) crosses over obstructions and forms bends over the obstructions as the optical fiber is wound on the tank. *Jones* (Figure 5) teaches an optical fiber (1) helically wound about a cylindrical object (7) in two directions, wherein the fiber (1) crosses over obstructions (another part of the fiber) and forms bends over the obstruction. It would have been obvious to one of ordinary skill in the art at the time of the invention to form bends in the fiber around the tank in *Innocenti*, as taught by *Jones*, as an additional indication that a pressure has been indicated, and hence a change in volume. (See *Jones*, columns 3-4.)

Regarding claim 5, *Innocenti as modified by Jones* (*Jones*; Figure 5) teaches an optical fiber (1) is wound helically in first spaced coils over the cylindrical object (7) in a first direction and is wound helically in second spaced coils over the cylindrical object (7) and over the first

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spaced coils in a second direction, and wherein the first spaced coils form the obstructions and the second spaced coils form the bends where the second spaced coils cross over the first spaced coils as pinch points.

Regarding claim 6, *Innocenti as modified by Jones (Innocenti, Figure 1)* teaches that the first and second coils are secured to the tank.

Regarding claims 7, 13, and 18, *Innocenti as modified by Jones (Jones; Figure 5)* teaches pinch points (8), but does not teach that the pinch points are secured to the tank with a flexible adhesive. It is known in the art to use a flexible adhesive to connect an item to ensure connectivity but allow for flexibility. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a flexible adhesive in *Innocenti in view of Jones* to allow for the micro-bending in the fiber, thus detecting change of pressure and hence volume.

Regarding claim 9, *Innocenti as modified by Jones (Innocenti, Figure 1)* teaches that providing the tank comprises providing a cylindrical tank liner (2), wherein the providing an optical fiber and obstructions on the tank comprises winding the optical fiber in first spaced helical convolutions in a first direction along the cylindrical tank liner and winding the optical fiber in second spaced helical convolutions in a second direction along the cylindrical tank liner and forming the pinch points in the second spaced helical convolutions where they cross over the first helical convolutions of the optical fiber (*Jones, Figure 5*).

Regarding claim 10, *Innocenti as modified by Jones (Innocenti, Figure 1)* teaches covering the optical fiber (4) with an isolator layer (3).

Regarding claim 11, *Innocenti as modified by Jones (Innocenti, Figure 1)* teaches an insulator/cover layer (3) comprising filament windings (column 2, lines 28-29) over the optical

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fiber (4) and over the tank liner (2) to support internal pressures within the tank liner, but does not teach that the filament windings are separate from the insulator layer. It is known in the art to use particular layering structures in pressurized gas tanks. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a particular layering structure in *Innocenti as modified by Jones* to achieve optimum support of internal pressures.

Regarding claims 12 and 17, *Innocenti as modified by Jones (Innocenti, Figure 1)* teaches securing an optical fiber (4) to a tank (1), but does not teach the means of securing. It is known in the art to use particular adhesives to secure components to each other. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a particular adhesive in *Innocenti as modified by Jones* to ensure accurate placement and stability of the optical fiber.

Regarding claim 14, *Innocenti as modified by Jones (Innocenti; Figure 1)* further comprising connecting a light source (6) to one end of the optical fiber (4) and connecting a light sensor (8) to the other end of the optical fiber (4), increasing pressure within the tank liner (2), increasing bending in the pinch points (8) by resisting the increasing pressure with the filament windings, and observing transmitted light attenuation in the light sensor (6) related to expansion of the tank liner (2) and increasing bending of the pinch points (8).

Regarding claim 16, *Innocenti as modified by Jones (Innocenti; Figure 1)* teaches an optical coupling (7) connected to the end of the fiber (4), but does not teach that it is secured to the inlet and outlet of the tank liner (2). It is known in the art to position connectors in particular locations based on space constraint and desired detector configuration. It would have been obvious to one of ordinary skill in the art at the time of the invention to secure the ends of the



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fiber (4), and thus the couplers, at a particular location respective to the tank *Innocenti as modified by Jones* to provided a more compact device and improve detection efficiency.

Regarding claim 19, *Innocenti as modified by Jones (Innocenti; Figure 1)* teaches that the tank (1) has a geometric shape.

Regarding claim 20, *Innocenti as modified by Jones (Innocenti; Figure 1)* that the geometric shape is selected from cylinders, spheres, double-curves, and combinations thereof.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Davienne Monbleau whose telephone number is 571-272-1945. The examiner can normally be reached on Monday through Friday 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*Davienne Monbleau*

DNM